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REPORT OF THE SECTION ON MICROSCOPY, MICRO-
CHEMISTRY, AND SPECTRAL ANALYSIS.

On the Microscopical Examination of
Urinary Sediment.

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Report of Section on Microscopy, Micro-Chemistry, and Spectral Analysis.

ON THE MICROSCOPICAL EXAMINATION OF URINARY SEDIMENT.

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Physicians now generally recognize the fact that an examination of the urine forms an important part in making the diagnosis of any disease. In many cases negative results may satisfy, as excluding certain diseases. It is a matter of common occurrence that one physician not being successful in the treatment of a case, a consultant or another physician is tried, who, carefully examining the urine, a thing which the first adviser had failed to do, finds enough to throw considerable light on the malady and its treatment. In urinary analysis, an examination both chemical and microscopical should be made in all doubtful cases. The former is a matter not difficult for the majority of physicians, and there are few physicians who cannot make the ordinary tests for albumen, sugar, etc. The microscopical examination, however, is a matter not so simple. There are plenty of practitioners who cannot make a microscopical examination of the urinary sediment in a manner satisfactory to themselves. This part of the subject, although old and often discussed, may be repeated with advantage, even at the risk of uttering remarks well known and trite to many here.

First, as to the technique. The patient or attendant should be impressed every time with the importance of saving clean specimens of urine. The bottles and vessels in which the urine is collected and preserved should be scrupulously cleansed and dried. The urine obtained should be passed in the morning on rising and in the afternoon, so that two different samples may be examined. This is necessary, among other reasons, because the urine may be free from



albumen in the morning and loaded in the afternoon. These specimens should be examined as soon as possible after receiving them, and in case of keeping them, they should be preserved in a cool place, and some such substance as salicylic acid may be added which will not affect the examination.

Difficulties present themselves when the urine contains very much or very little sediment. When very little, it is the general custom to let it stand for twenty-four hours in a cool place in a conical glass, so that the sediment may drop to the bottom of the vessel. Casts when not abundant may remain suspended for a longer time in the urine, and owing to their lightness they may stick to the sloping sides of the glass and thus escape detection. Sometimes better results may be obtained by letting the urine stand in a cylindrical glass for twenty-four hours and then drawing up the bottom layer of fluid with a pipette and examining it. I have turned the bottle upside down for one day and then examined the sediment which had collected on the cork, but this is not usually satisfactory. For the microscope it is well to have a thick slide with a concavity ground in it.

When there is much sediment it is not easy to separate the important from the unimportant matters. In this case it is better to let the urine stand in a cool place in a conical glass for six or twelve hours, and then pipette off the supernatant fluid and let that stand in a second glass. Casts will be found in the second glass, and in the first, pus, blood, epithelium and inorganic matter.

There is a great difference between the urine of the male and female as regards sediment. Urine from the female generally contains large flakes of epithelium from the vagina, blood corpuscles, etc. This excess of sediment may be excluded by having the urine drawn off with a clean catheter, or by directing the patient to syringe out the vagina and genitals with warm water before urinating.

Red blood corpuscles are of no clinical significance unless present in large numbers. They may occasionally be mistaken for air or oil globules. Stray leucocytes are rarely absent, and are only to be considered when they are present in large numbers, as from a cystitis or rupture of some abscess in the genito-urinary-renal tract. Bladder epithelium, and in the female, vaginal epithelium, is always present. Some of the bladder and vaginal cells so strongly resemble each other that they at times cannot be distinguished, and indeed vaginal epithelial cells have been described as being present in the male urine

occasionally. Again, some cells from the bladder so much resemble epithelium from the ureter or renal pelvis that I always have trouble in distinguishing them. Renal epithelium, when it has not undergone fatty or other degeneration, is not difficult to recognize.

The principal object of the microscopical examination of the urine is to see if casts are present or absent. Although they are found in some of the acute diseases, and at times without sufficient explanation, still their continued presence cannot fail to be alarming. They should be looked for whether albumen be present or not. Albumen is often absent at the time of the microscopical examination, it having appeared at an earlier stage of the disease. Albuminuria without casts is said to be more common than it really is, and the majority of investigators agree in believing that they were present but could not be found. This was deduced from autopsies. In an interesting case* of cyclic or physiological albuminuria, I have never been able to find casts although I look at intervals.

I generally draw off a little of the sediment with a pipette, and drop it on a hollow slide, and examine it with a low power. The sediment may be then seen floating about. Most books warn against taking up too much fluid on the slide; I find this an advantage. I take up a large drop on an ordinary slide, and as the fluid runs along the slide, an opportunity is offered to review the sediment as it passes by, taking care, of course, that it does not get on the stage of the microscope. If casts are found, then another drop may be taken, and, before putting on a cover glass, a small bit of broken cover glass or a hair is put by the preparation and then covered. This prevents the casts from being crushed. I generally prefer to examine first without a cover glass, because it is rarely necessary to use such a high power that the objective comes near the preparation. Some writers suggest that when there is much sediment to roll the cover glass backward and forward with two fingers. I have done that several times and succeeded in making casts when there were none there. When a cover glass is used, as little liquid as possible should be taken up, and as this lessens the chance of finding them if few are present, it is not always advisable. Staining is generally superfluous, but if desirable, it is better to drop a little staining fluid in the urine, as staining under the cover glass causes the sediment to fly across the field at an alarming rate of speed and settle on the out-

* See author's article on "Cyclic Albuminuria," in the Philadelphia Medical News, July 30th, 1887.

side of the glass. This may be prevented by allowing the casts to dry on the slide and then staining; but this is apt to change their appearance and is not advisable. The best way is to stain them before the cover glass is put on.

"Tube casts, or urinary cylinders, form by far the most important pathological constituent of urinary sediment. They are so called because they are supposed to be moulds of the uriniferous tubules of the kidney. After being thus moulded, they shrink and are carried out with the urine. They are supposed to be formed by a coagulable substance in the blood, or by some morbid change of the renal epithelium. According to their appearance and composition, casts have received different names. If the mould of coagulated fibrin pass out with the urine without blood or cell, it is called a hyaline or waxy cast. According as epithelium, blood, fat drops, or granular matter [the two last from degenerated epithelium] are adherent to the moulds of fibrin, the casts are called respectively epithelial, blood, fat, or granular casts. These casts vary in diameter [from $\frac{1}{2500}$ to $\frac{1}{500}$ of an inch] according to the part of the tubule from which they come. Hyaline casts are generally smaller than those to which epithelium, blood, etc., are attached. Mucous casts have also been described. Amorphous sediment and small crystals may adhere to casts, and they also sometimes arrange themselves in a cylindrical form and deceive the inexperienced. Casts of the urates and of bacteria may be mentioned. In cleaning slides and cover glasses, bits of linen threads are often left on the glass and may be mistaken for hyaline casts."* Occasionally bladder or vaginal epithelium becomes rolled up and looks very much like casts. It is almost superfluous to say that, as the finding of casts is generally of grave significance, a decision should not be reached by one examination, but many slides should be prepared. The laity soon knows the gravity of casts in the urine, and let a man once be rejected by a life insurance company, it is a serious shock to him. Therefore not without careful examination and consideration should a decision be made in this most important subject.

*Practical Notes on Urinary Analysis, by the author. Baltimore: Journal, Publishing Co., 1887.

